REMARKS

Support for the amendments to claims 21, 26, 39 and 40 and additional claims 44-51 are found in the specification at the following locations. For claim 21 support is found in the specification at the same location as that for claim 38. Claim 26 is amended to change the dependency to claim 25. Claims 44, 45 and 46 find support in the specification at page 7, lines 11-26. Added claim 47 finds support in the specification at page 4, lines 14-17, and page 5, lines 1-5. Support for claims 48-50 is found in the specification at the same location as previously submitted claims 21 and 36. Support for added claim 51 is found in the specification at the same location as that for claims 21 and 36 and page 5, lines 6-28.

Previously submitted claims 39 and 40 were rejected under 35 U.S.C. 112, second paragraph for indefiniteness for some claim language directed to the relatedness of the claims.

It is respectfully submitted that claims 39 and 40 have been amended to clearly delineate the relationship between the claims. With this amendment it is respectfully submitted that any 112 indefiniteness concern is overcome.

Previously submitted claims 21-24 and 27-35 were rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent 4,522,844 to Khanna et al.

It is respectfully submitted that the Khanna et al. reference does not teach or suggest an additional metal oxide film over a film of amorphous metal as now claimed in claim 1 and claims dependent therefrom. Nor does the Khanna et al. reference teach the oxidation of the film with amorphous metal structure to a metal oxide as now claimed in claims 36, 37, 38, 39 and 48-52.

For these reasons it is respectfully submitted that claims 21-24 and 27-35 and added claims 44-51 are novel and unobvious over the Khanna et al.

Previously submitted claims 21-25 and 27-43 were rejected over the Depauw reference U.S. Patent 5,110,662. It is respectfully submitted that the Depauw reference does not teach or suggest a metal layer with amorphous metal. For this reason it is

respectfully submitted that claims 21-25 and 27-43 and added claims 44-51 are novel and unobvious over the Depauw reference. It is respectfully submitted that the Depauw reference does teach that the metal oxide film can be deposited in a suboxide condition but this still would be the deposition of a metal oxide. This would not be the deposition in the metal mode as claimed by applicants.

Also the Depauw reference does state at column 5, lines 1-3, that "at least part of the product may be present as a sub-oxide or even in the metallic state. This is merely the teaching or suggestion of just a part of the sputtering of a metal in an oxide-containing atmosphere can result in an oxide product which is not necessarily in the fully oxidized state. This teaching is that the metal oxide is still deposited where part of the deposition can be metallic. **This does not state whether the metallic state is crystalline or amorphous. Also this does not teach the deposition of an amorphous metal from sputtering before the switch point from sputtering metal and depositing metal oxide over the amorphous metal**. This is what applicants are claiming in the pending claims. Therefore, it is respectfully submitted that the claims 21-25 and 27-43 are novel and unobvious over the Depauw reference.

product by process

Previously submitted claims 21-43 were rejected under 35 U.S.C. 103(a) as unpatentable over U.S. Patent 5,110,662 to Depauw et al. in view of U.S. Patent 4,522,844 to Khanna et al.

It is respectfully submitted that one skilled in the art would not combine these references since they teach away from their combination. The Khanna et al. reference is teaching the deposition of an amorphous metal film for corrosion protection where the film is essentially void of micro structures such as columns, voids, pin holes, etc. It is noted in the Khanna reference at column 1, lines 45-52, that the inventors have found that higher pressures or if the gas constituents react with the metal, the desired pin-hole-free film is not formed. If, on the other hand, there are no reactive gases present and the gas pressure is low, a thin, uniform, homogeneous, essentially pin-hole-free film is formed on the substrate. In this reference's examples, the films deposited with the five microns of argon and approximately two microns of oxygen

exhibit highly developed zone structure with poorly bonded vertical columns, large voids and dispersed surface mounts. The lumpy top surface and multiple crack fracture cross-section of such a film is the one shown in Fig. 3c.

It is respectfully submitted that the patent to Khanna teaches away from amorphous metal films under metal oxide films since there is not teaching or suggestion that a metal in an amorphous state gives any protection from corrosion. The film formed from the five microns of argon and approximately two microns of nitrogen exhibited a void-free and dense vertical columnar structure in the fraction cross-section as shown in Fig. 3d and the film may have had some segregated regions as crystalline inclusions.

It is respectfully submitted that there is no teaching or suggestion in the Khanna et al. reference to have additional films or layers present such as an additional metal oxide film over the amorphous metal film. This is the case especially when the amorphous metal film is produced from sputtering in the presence of reactive gases to the extent of still sputtering in the metal mode. Nor is there any teaching or suggestion to oxidize the formed metal film in the Khanna et al. reference.

The Depauw reference teaches away from having an amorphous metal film where it is noted that the silver and the sacrificial metal layers should each be deposited in an inert atmosphere, for example, argon at column 4, lines 60-62. It is noted further at lines 67 and 68 in sputtering of metal in an oxygen-containing atmosphere, the oxide product is not necessarily obtained in the fully oxidized state. But this is still the deposition of a metal oxide layer in the sputtering of metal in an oxygen-containing atmosphere. This teaching appears in the patent after a disclosure of the fact that layers other than the silver and the sacrificial metal layers can either be produced by depositing oxide as such or more preferably by reactive sputtering of the respective metal in an oxygen-containing atmosphere. It is respectfully submitted that the Depauw patent teaches away from sputtering the silver and the sacrificial metal layer in an oxygen-containing atmosphere. The disclosure of sputtering a metal in an

oxygen-containing atmosphere is to produce a metal oxide not a metal. This is made clear from the examples where every deposition of silver and the sacrificial metal layer is done in an inert atmosphere. This is illustrated at column 9 for example 1 at lines 44-48:

> "The oxygen was then evacuated and the substrate moved back past the sputtering sources with the silver and second titanium sources activated but this time with argon as a sputtering gas to add a silver layer and titanium layer."

Therefore, it is respectfully submitted that a skilled person in the art would not combine the Depauw and Khanna references since there is no teaching of equivalency between an amorphous metal film and a metal sputtered in an inert atmosphere as in Depauw or a metal oxide film deposited in an oxygen-containing atmosphere where the metal oxide film may have some suboxides and even some metallic state as in Khanna.

Accordingly, in view of the above amendments, explanations and remarks, reconsideration and allowance of the claims are respectfully requested. This amendment represents a sincere effort to place the application in condition for allowance. In the event issues remain, the Examiner is invited to call the undersigned to discuss those issues before further action is taken on the case.

Attached hereto is a marked-up version of the amendments to the claims made by the instant amendment. The attached page is captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE"**.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please amend claims 21, 26, 39, and 40 and add claims 44-52 in the below indicated manner.

21. (Amended) A coated product comprising:

a substrate; ~~and~~

a film sputtered from a metal cathode target in an atmosphere comprising inert gas and reactive gas, the metal in the metal cathode target having a reactive gas switch point, wherein the concentration of the reactive gas during sputtering is below the reactive gas switch point such that the metal target is sputtered in a metallic mode to deposit a metal film having an amorphous structure defined as an amorphous metal film; and

a metal oxide film over the amorphous metal film.

26. (amended) The product in accordance with claim 25, wherein the metal film has a thickness ranging from 200 Å to 700Å.

39. (Amended) The product in accordance with claim 38, wherein the metal oxide film deposited over the metal film has a thickness ranging from 40Å to 120Å.

40. (Amended) The product in accordance with claim 38, wherein the substrate is glass, the metal in each film is titanium, the density of the metal oxide film deposited over the metal film is 4 grams per cubic centimeter and the refractive index of the metal oxide film is 2.5

44. Product in accordance with Claim 21, wherein the metal oxide film is comprised of the same metal as the underlying amorphous metal layer.

45. Product in accordance with Claim 21, wherein the metal oxide film is comprised of reactively sputtered amorphous metal oxide to increase the thermal stability of the amorphous metal film.

46. Product in accordance with Claim 21, wherein the metal oxide film has a thickness of 40 to 120 Angstroms.

47. Product in accordance with Claim 21, wherein the amorphous metal layer is harder and less dense than a crystalline metal film sputtered in pure argon and the lower density enhances the rate of oxidation so that the amorphous metal film may be thoroughly oxidized at lower temperatures or in shorter times than required for oxidation of crystalline metal film.

48. A coated product comprising:

a substrate; and

a metal oxide film from oxidation of an essentially amorphous metal film sputtered from a metal cathode target in an atmosphere comprising inert gas and reactive gas, the metal in the metal cathode target having a reactive gas switch point, wherein the concentration of the reactive gas during sputtering is below the reactive gas switch point such that the metal target is sputtered in a metallic mode to deposit a metal film having an amorphous structure.

49. Product in accordance with Claim 47, wherein oxidation is by thermal oxidation.

50. Product in accordance with Claim 47, wherein the metal oxide is comprised of crystalline metal oxide.

51. A coated product comprising:

a substrate; and

a metal oxide film comprised of crystalline metal oxide from oxidation of an essentially amorphous metal film sputtered from a metal cathode target in an atmosphere comprising inert gas and reactive gas, the metal in the metal cathode target having a reactive gas switch point, wherein the concentration of the reactive gas during sputtering is below the reactive gas switch point such that the metal target is sputtered in a metallic mode to deposit a metal film having an amorphous structure; and

a metal oxide film over the crystalline metal oxide film, where the metal oxide film is deposited by reactive sputtering of amorphous metal oxide over the amorphous metal film.

52. The coated product of Claim 50, wherein the crystallized metal oxide film is titanium oxide film with a crystalline structure having a density greater than 3.4 g/cm^3.